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COMPOSITES FOR PAPER COATING
[紙被覆用組成物]

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SPECIFICATION

1. Title of the Invention

Composites for Paper Coating

2. Scope of Patent Claims

1. Composites for paper coating, comprising composites as their major coating agent, which consist of pigments, cationic dispersing agents, water-soluble high molecules, and cationic polymers.
2. The composites for paper coating, according to Claim 1 for the Patent, comprising composites, which consist of 0.1 to 5 parts by weight of cationic dispersing agents, 0 to 20 parts by weight of water-soluble high molecules, and 3 to 30 parts by weight of cationic polymers to 100 parts by weight of pigments.

3. Detailed Description of the Invention

(1) Purpose of the Invention

[Industrial Application Field]

The purpose of the present invention is to enhance both the surface strength and inking properties of coated paper.

[Prior Art]

It has been already known that mineral pigments are applied to paper to enhance its surface smoothness, as well as to enhance its printing ability, and such coated paper is used for

numerous multi-color printed materials. To enhance the added values of coated paper, kaolin is easily dispersible, inorganic or organic pigments having a prescribed grain size, calcium carbonate, satin white, and the like, are used for different purposes. Moreover, used as an adhesive are water-soluble high molecules, such as casein, starch, polyvinyl alcohol; synthetic rubber latex; and synthetic resin emulsion. Various coated papers are produced and put to practical use with these coating agents to form a coating layer, coated-paper base, painting facilities, and painting technique for using elements and others efficiently.

However, in order to use gloss inks, a binder that provides stronger surface strength is increasingly required. Moreover, this is becoming a big problem for those skilled in the art.

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Inking properties are easily affected by various factors, and these phenomena need to be rapidly solved. Especially, it is very important for binders for paper coating to obtain satisfactory inking properties for offset printing. Generally, surface strength and inking properties are thought to be factors to conflict with each other, and it seems to be a virtually impossible task to enhance both properties together.

[Problem to Be Solved by the Invention]

The present inventors eagerly conducted numerous studies in

order to enhance both the surface strength and inking properties of coated papers and thus accomplished the present invention.

(2) Structure of the Invention

As the present inventors found, the present invention is that coated papers having a superior surface strength, inking properties, and print gloss can be obtained by including composites, which consist of pigments, cationic dispersing agents, water-soluble high molecules, and cationic polymers, as a major coating for such papers.

The examples of pigments are kaolin clay, titanium oxide, calcium carbonate, aluminum hydroxide, talk, barium sulfate, satin white, and other inorganic pigments. As organic pigments, carbon black and phthalocyanine blue, which are used generally, can be used.

As a cationic dispersing agent, a cationic polymer dispersing agent with a low degree of polymerization, which can be prepared by conducting radical polymerization with 5 to 100 parts by weight of polymerizable cationic monomers, 0 to 20 parts by weight of monomers containing hydroxyl groups, and 0 to 95 parts by weight of other polymerizable monomers, is suitable. 0.1 to 5 parts by weight of this agent is used to 100 parts by weight of pigments. If the amount is less than 0.1 parts by weight, the effect is not sufficient. Even though the amount is more than 5 parts by weight, the effect is not enhanced, and it

is not favorable from an economic perspective.

The examples of water-soluble high molecules include starches, oxidized starches, aminated starches, and cationic starches.

Moreover, casein, soybean protein, polyvinyl alcohol, cationic degenerated polyvinyl alcohol, hydroxyethyl cellulose, methylcellulose, polyacrylamide, and the like, can be used together. Moreover, melamine-formalin resin, urea-formalin resin, water-soluble epoxy resins, water-soluble polyamide-epichlorohydrin degenerated resin, water-soluble polyurethane resin, and the like, can be used.

0 to 20 parts by weight of these [items] can be used for a total of 100 parts by weight of pigment. If the amount is more than 20 parts by weight, the viscosity becomes higher, and the liquidity and water resistance deteriorate.

Other ingredients like antifoaming agents, lubricants, and the like, which are generally used, can be added if necessary.

The examples of cationic polymers include cationic SBR latex, NBR latex, MB latex, CR latex, acryl emulsion, vinyl acetate emulsion, and ethylene vinyl acetate emulsion. 3 to 30 parts by weight of these (solid contents) of these can be used to 100 parts by weight of pigments. If the amount is less than 3 parts by weight, both water resistance and printing aptness deteriorate. If the amount is more than 30 parts by weight, it

is not favorable from an economic perspective.

Examples are described below, but the present invention is not limited to these examples.

(3) – 1 Example

(a) 383 g of ion exchanged water and 124 g of 3-methacryloxy-2-hydroxypropyltrimethylammonium chloride were put into a reactor displaced with nitrogen gas to which 61.8 g of acrylonitrile and 20.6 g of hydroxyethyl acrylate were then added under stirring, and the temperature was raised to 80°C. A solution wherein 11.1 g of 2,2’-azobis(2-amidinopropane) hydrochloride (AIBA) was resolved in 100 g of ion exchanged water was added for four hours to conduct polymerization. After the addition, maturing was conducted for two hours, and thus a cationic dispersing agent was prepared.

(b) 4775 g of ion exchanged water, 10 g of sodium bicarbonate, and 150 g of cationic emulsifier were put into an autoclave displaced with nitrogen gas to which 2250 g of styrene, 2650 g of butadiene, 100 g of hydroxyethyl

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acrylate were then added under stirring, and the temperature was raised to 75 ℃. 20 g of AIBA was then added to conduct polymerization.

Polymerization was conducted for 18 hours, and cationic

polymer latex with 98% or more polymerization conversion rate was prepared.

(c) 100 g of kaolin clay (Shokozan K clay) and 1 g (solid contents) of the cationic dispersing agent prepared in (a) were added to water, dispersion was mechanically conducted, and thus a pigment slurry with 50% solid contents was prepared. Next, 16.7 g of 30% aqueous solution of oxidized starch was added and mixed. 15 g (solid contents) of the cationic polymer latex prepared in (b) was further added and well mixed together, and thus composites for paper coating with 48% solid contents, 350 cps of viscosity, and pH 4.0 were prepared.

The composites for paper coating were coated on high-quality paper (weighing: 81.5 g/m^2) by about 10 g/m^2, and a coated paper was prepared with a normal method.

This was coated paper A.

The results are shown in Table-1.

(3) – 2 Example

80 g of Shokozan K – clay, 70 g of water, and 0.8 g (solid contents) of cationic dispersing agent were added and dispersed together. Then, 20 g of calcium carbonate for painting, 20 g of water, and 0.2 g (solid contents) of cationic dispersing agent were added and dispersed together. While these both dispersions were stirred together, 15.7 g of 30% solution of oxidized starch

was added to this mixture, and all of them were mixed together. 15 g (solid contents) of said cationic latex was further added and well mixed together, and thus composites for paper coating with 50.2% solid contents, 500 cps of viscosity, and pH 7.4 were prepared.

A coated paper was prepared similarly as Example 1.

This was coated paper B.

As a comparison example, a coated paper was manufactured with styrene-butadiene copolymer latex.

Evaluation Methods

○ RI Dry Pick:

The degree of picking when printing was conducted with an RI printer and was judged with the naked eye and assessed on a scale of grade 1 (the best) to 4 (the worst).

The mean values of six assessments are shown.

○ RI Wet Pick:

The degree of picking when printing was conducted under wetting with an RI printer and water was judged with the naked eye and assessed on a scale of grade 1 (the best) to 4 (the worst). The mean values of six assessments are shown.

○ Inking under Wetness:

The surface of each coated paper was wetted with an RI printer and water, and then printing was conducted with ink with low tack. After the printing, the transition of ink to each

coated paper was judged with color density and with the naked eye and classified on four scales (1: the best; 4: the worst).

○ Gloss on Blank Paper

The reflectance was measured with a 75° measurement angle with a Murakami gloss meter. Bigger numbers show better gloss values on blank paper.

○ Print Gloss

One time plain printing was conducted with an RI printer and 0.4 cc of red ink for offset printing on the market. The printed matters were left alone for one day and night at a room temperature. The surfaces of these test papers were measured with 75° of measurement angle with a Murakami gloss meter. Bigger numbers show better gloss values on printing.

The results are shown in Table-1.

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Table - 1

	Coated Paper A	Coated Paper B	Comparison Example
RI Dry Pick	1.0	1.2	3.0
RI Wet Pick	2.0	2.0	2.0
Inking under Wetness	1.2	1.0	4.0
Gloss on Blank Paper	25.1	22.0	24.0
Print Gloss	46.7	35.0	37.0

△ GL	21.6	13.0	13.0